

Targeted Watershed Assessment

Water Quality

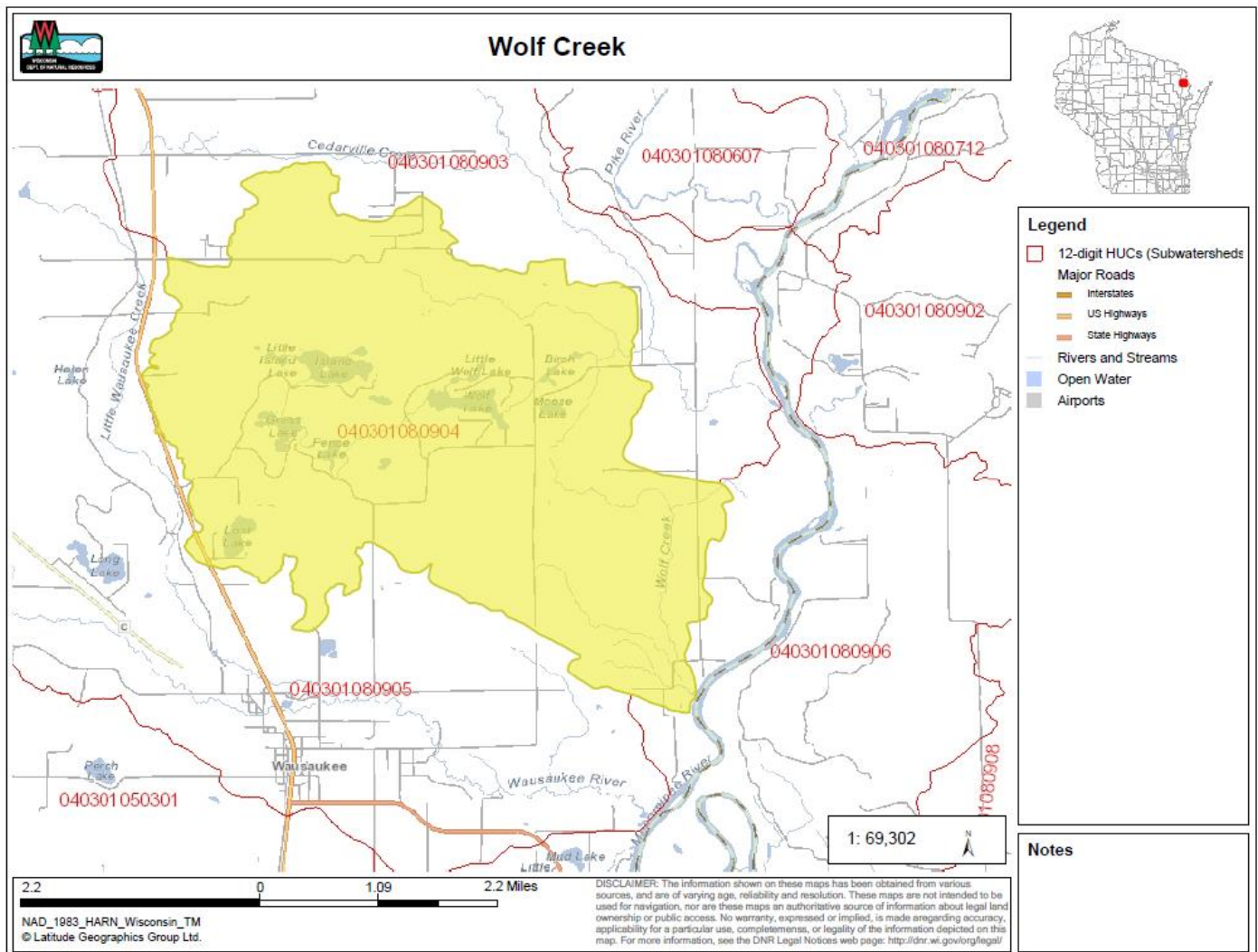
In

The Wolf Creek Watershed

2014

Marinette County, Wisconsin

Project ID East_TWA_3_2014



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December 2015

EGAD 3200-2015-20

Wolf Creek-Targeted Watershed Monitoring Report 2014



Introduction

The Wolf Creek watershed is a 15.71 square mile, HUC-12 sub-watershed that lies in the Wausaukee and Lower Menomonee River watershed in Marinette County. Soils and topography in the Wolf Creek sub-watershed are unique in that the entire area is fairly isolated with glacial deposits forming distinctive breaks in the upper watershed surrounding the lakes and then dropping into poorly drained organic soils immediately adjacent to the lakes and streams. Wetlands are extensive throughout the watershed along the stream and lake corridors with minimal fragmentation.

Land use in the watershed is primarily upland forest, lowland swamp and bogs, and open water with agriculture making up only about 1% of the total land use. What agriculture does exist are a few small beef cattle herds with land in hay and row crops. The watershed is fairly simple with one main stream, Wolf Creek, which is an 11.0 mile long tributary to the Menomonee River which connects and drains approximately 10 lakes in the upper portion of the watershed. A connection exists between Wolf Creek and Holmes Creek that is artificial and likely served the logging industry in the late 1800's when saw logs were floated down small streams to the Menomonee River where they were floated down to sawmills. This connection reduced the distance logs had to be floated down to the Menomonee River by 2.5 miles. Logging still appears to be very active in the watershed for the income and the localized economy.

Methods

Water quality monitoring was conducted at 6 wadeable sites throughout the watershed in the spring, summer, and fall of 2014. During each field visit, basic water quality parameters including air temperature, water temperature, conductivity, dissolved oxygen, dissolved oxygen percent, pH, flow, and water clarity were collected. Total Phosphorous samples were collected by a citizen volunteer once per month throughout the growing season from May-October. A continuous temperature HOBO was installed at this site and collected continuous water temperature reading between May-October.

Site Selection – Sites were selected so data would not be biased toward stream order, location, or natural community; however sites may have been targeted based access, limited or outdated data for that particular stream reach. Sample stations were established to limit outside influences and set-up using DNR field procedures manuals of 35 times the mean stream width (Modified from Simonson, et al. 1994). Stations were no less than the minimum of 100 meters and no more than the maximum of 400 meters.

Continuous Water Temperature Monitoring- An Onset Hobo water temperature data logger was placed within the sample station used for fish and habitat survey at the station nearest the pour point on Pike River Road. Temperature readings were collected every 15 minutes from May thru October. Temperature data will be used to determine relative thermal regimes for the sample station and to ascertain average daily summer time maximum temperatures.

Fish Surveys- Fish surveys were completed through the identified sample station. A direct current electrofishing backpack shocker or tow behind stream shocker was used to collect all fish possible through an upstream pass through the sample station. Typically the back pack units were used on the small streams up to 3 meters with a single probe and the stream shockers were used with a generator and 2 probes on the remainder of sites over 3 meters. All fish were collected, identified, and counted. All gamefish were measured. All other WDNR sampling protocols were used to assess the fish community for purposes of calculating the index of biotic integrity.

Habitat Surveys- At the established pour point station, a quantitative habitat evaluation was completed. A total of 12 transects were located equidistant throughout the station to sample representative available habitat. Quantitative habitat metrics were collected such as average stream width and depths, depths of fines, substrate, embeddedness of substrate, macrophyte or algal growth, canopy cover, riparian buffers, land use, stream bank erosion, and fish cover. The station length was established at a distance 35 times the mean stream width. The remaining stations had qualitative habitat assessments completed which utilizes a condensed protocol but obtains the same habitat metrics as quantitative habitat protocols.

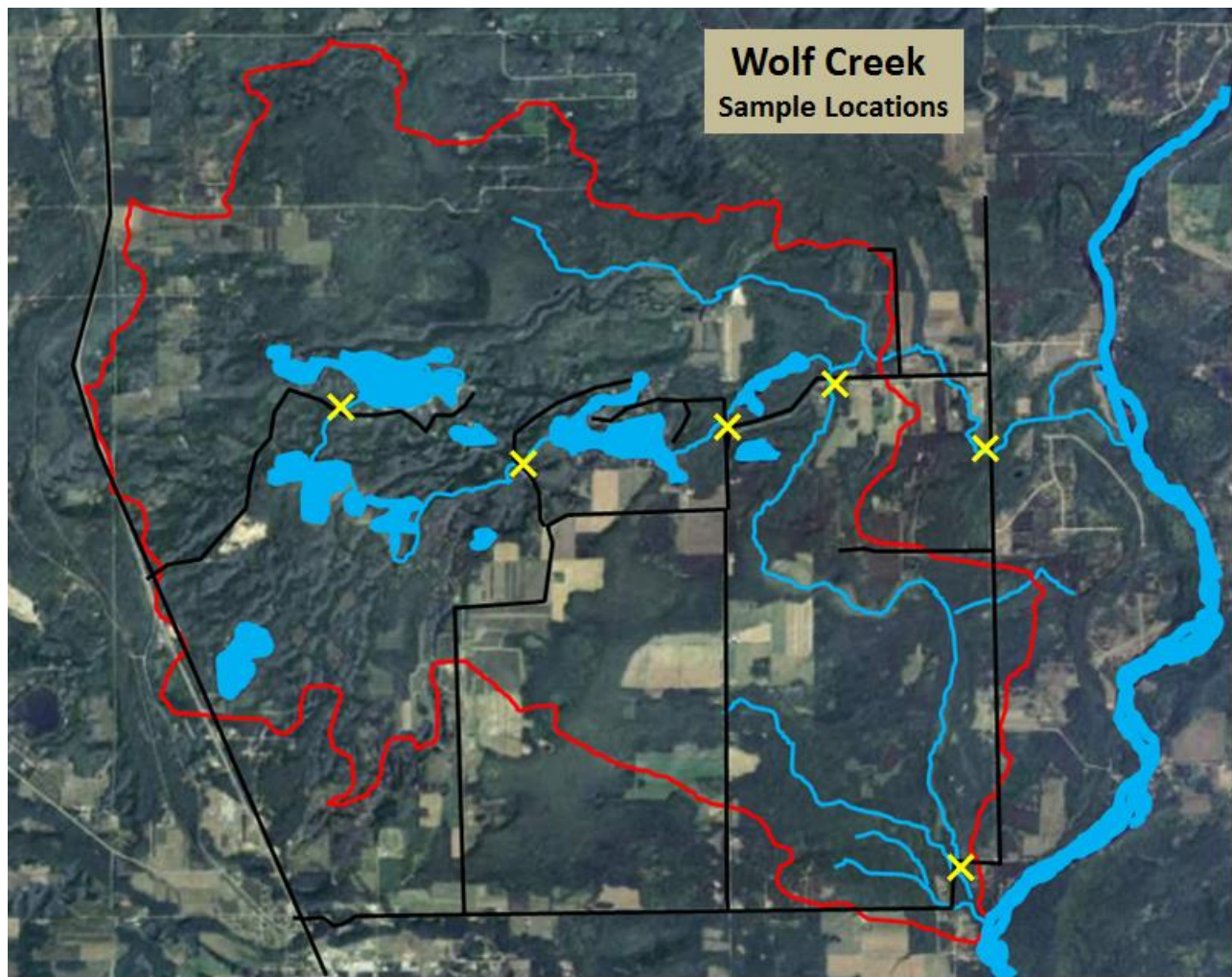
Macroinvertebrate Sampling- Macroinvertebrate samples were obtained by kick sampling a collection using a D-frame net at all 6 sites in the watershed in fall. These samples were sent to the University of Wisconsin-

Stevens Point for taxonomic classification, analysis, and computation of a Macroinvertebrate (M-IBI) and other usable metrics.

Table 1: Sample site survey locations in the Wolf Creek 2014

Waterbody	WBIC	Location	Order
Wolf Creek	613900	Downstream Pike River Road	2
Wolf Creek	613900	Downstream Lubke Road	2
Wolf Creek	613900	Upstream Keating Road	2
Wolf Creek	613900	Upstream Island Lake Road	2
Wolf Creek	613900	Upstream Narragon Road	2
Holmes Creek	615400	Upstream Pike River Road	3

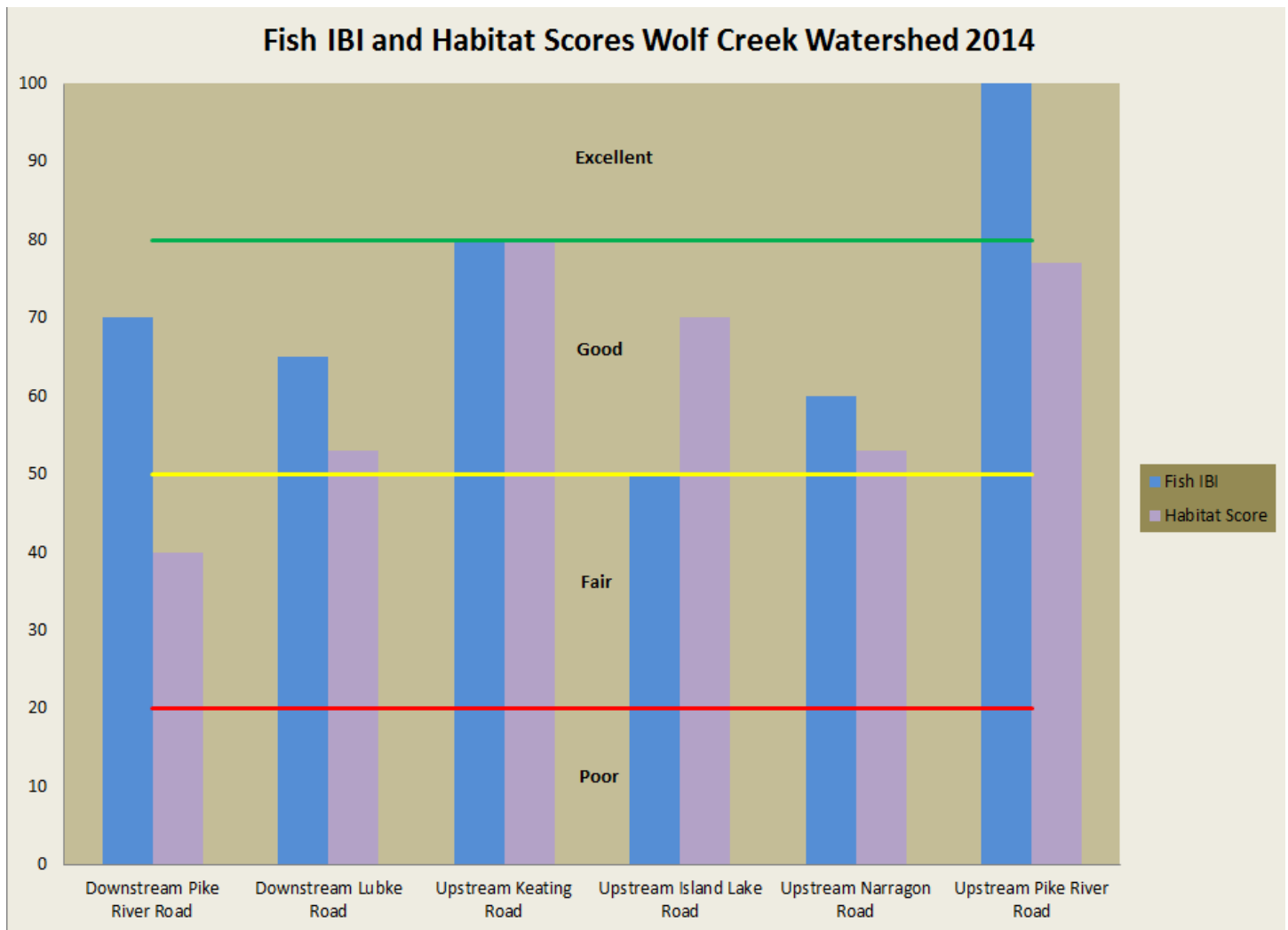
Figure 1: Sample site survey locations in the Wolf Creek 2014



SUMMARY RESULTS

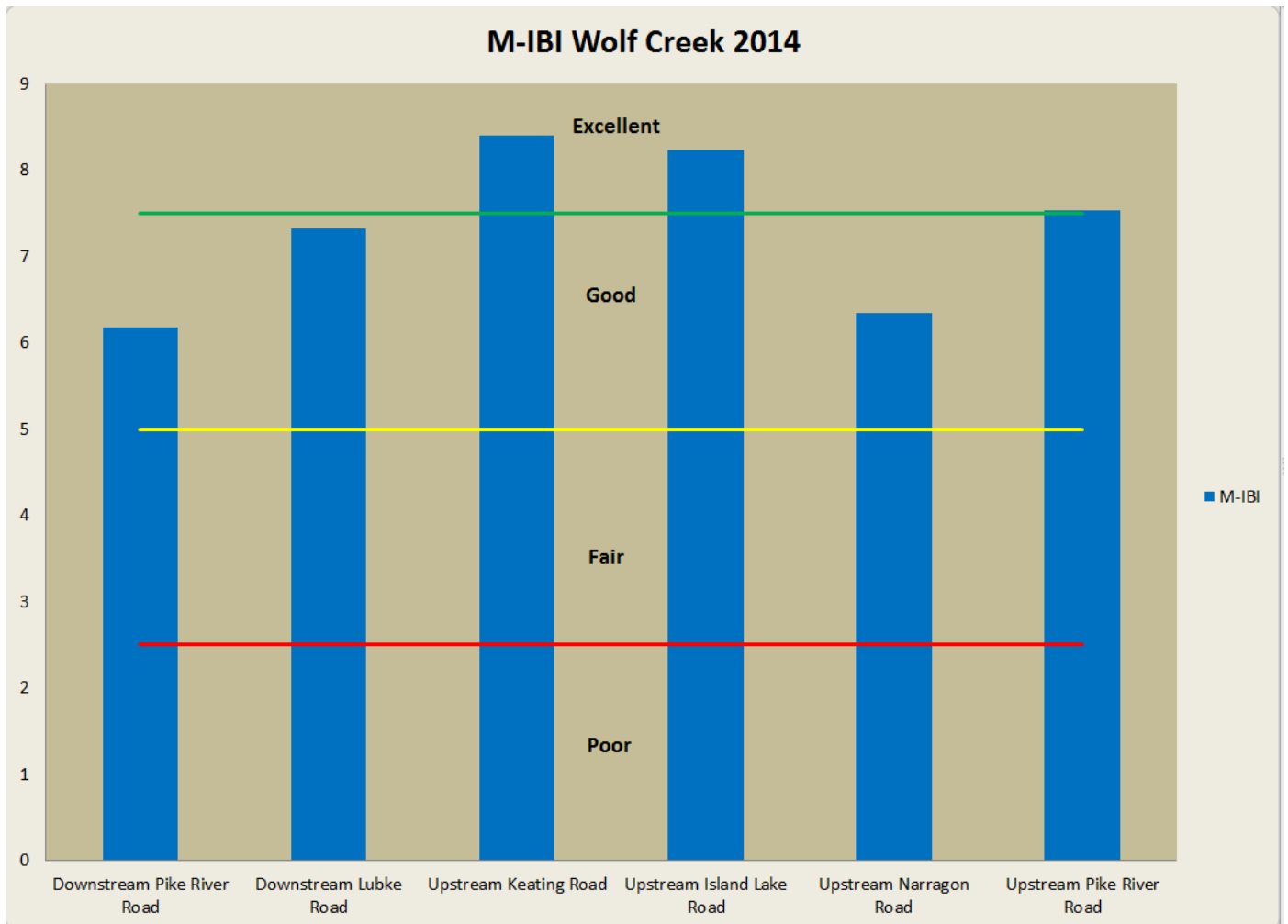
Results for the fisheries and habitat surveys are summarized in Table 2. The natural communities model (Lyons, 2008) indicates that the streams in the Wolf Creek in the upper watershed is a cool-warm headwater and then transitions into a cool-warm mainstem downstream of Lubke Road. Holmes Creek is modeled as a cool-warm mainstem. Based on the natural community verification draft guidance (Lyons 2014), Wolf Creek trends towards a warmwater stream with headwater characteristics present at the upstream station and the remainder of the stream would be considered mainstem based on fish assemblages observed. Holmes Creek was confirmed as a cool-warm mainstem. Based on the verified natural community, the applicable IBI was applied to achieve a score and rating.

Figure 2- Fish IBI and Habitat Scores for Wolf Creek Watershed Survey 2014



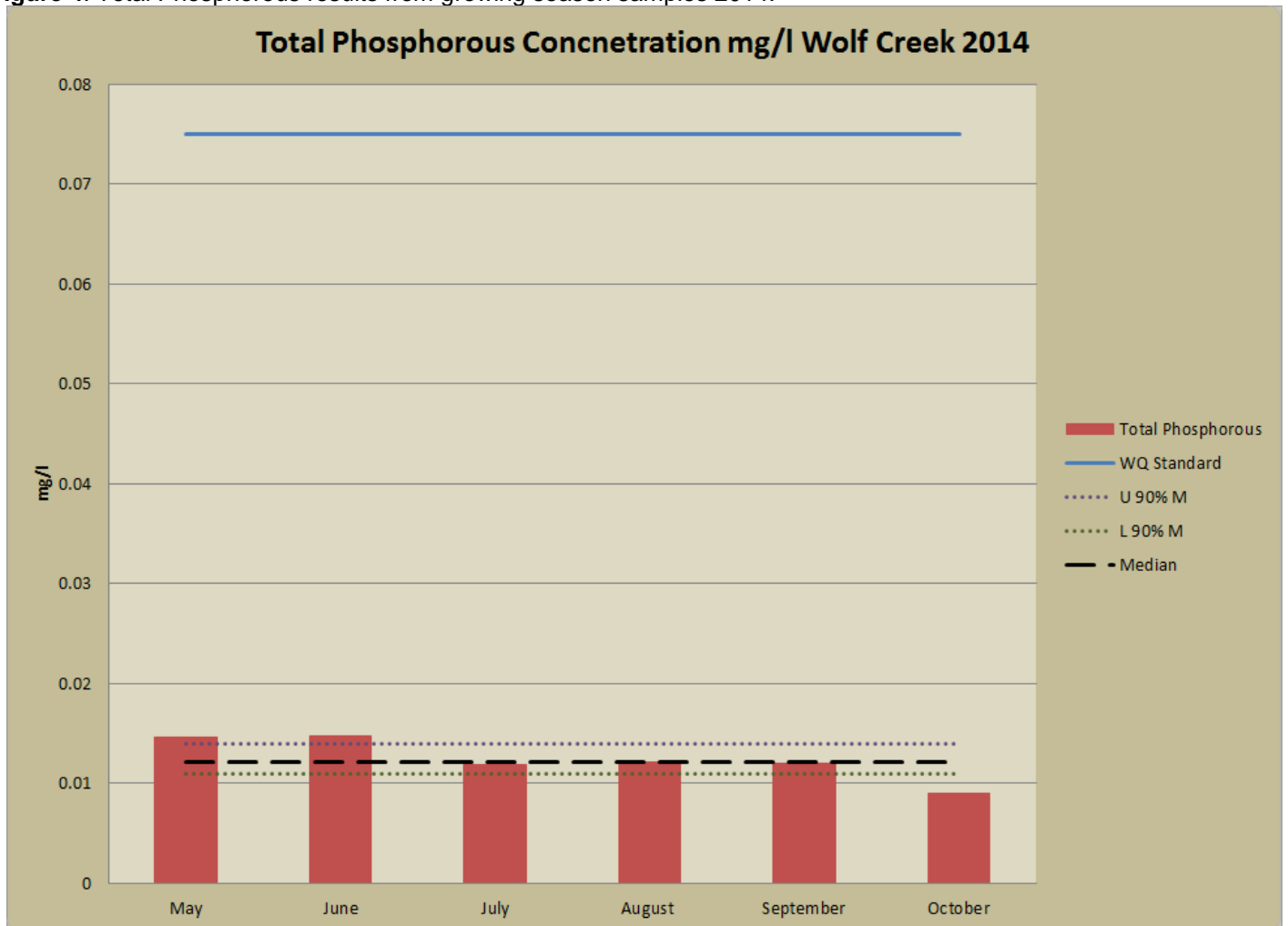
Macroinvertebrate samples were collected at all sites and evaluated with the Hilsenhoff Biotic indices (HBI, Hilsenhoff, 1987), Family level Biotic Indices (FBI, Hilsenhoff 1988) and the Macroinvertebrate index of biotic integrity (MIBI, Weigel, 2003). Results were consistently good to excellent for all sites sampled. (See Table 3)

Figure 3- Macroinvertebrate IBI Scores for Wolf Creek Watershed Survey 2014



Total Phosphorous samples were collected once per month at the site furthest downstream within the watershed at Pike River Road also known as the pour point. Total Phosphorous concentration fell well below the state standard of 0.075 mg/l.

Figure 4. Total Phosphorous results from growing season samples 2014.



DISCUSSION

Wolf Creek was selected for evaluation monitoring in 2014. Based on current surveys, it would appear water quality of the streams in the Wolf Creek watershed, are in overall good to excellent condition. Current land use practices in the region do not appear to be causing adverse impacts to water quality conditions. Total Phosphorous concentrations at the pour point would suggest that nutrients are in balance and excess phosphorous is not a problem. Habitat is likely the limiting factor for the streams potential. Stream habitat varies greatly between the station at Pike River Road and the 4 other stations upstream. The upstream site had good habitat for being a small stream. Pools were lacking but woody cover for fish and riffle sequences were present. The mid-reach stations are dominated by excessive fines, coarse woody debris, and at times, dense macrophyte growth. Both submergent and emergent species are contained within the channel thalweg and margins and no non-native exotic species were observed. The excessive fines, likely from legacy impacts of logging, and beaver activity, support the macrophytic growth but also bury coarse woody debris and harder substrate such as gravel and cobble. These stations serve as connections between the lakes and often times appear more lacustrine than riverine in nature based on the macrophyte growth. The station located at Pike River Road was relatively wide and shallow which lead to the lack of pools and limited cover for fish. This station is also extensively dominated by sands however rocky riffles were common and the riffle to riffle ratio was good which provided suitable habitat for a large bio-mass of non-game species. Potential threats to water quality continue to be poor logging practices and new nutrient source inputs from development or agriculture. The protection of the riparian corridors and landscape of the streams and lakes in this watershed should be the highest priority. Sustainable forest and woodlot management should be the standards and forestry best management practices to protect water quality should be strictly followed. Land divisions and new development in the riparian areas of lakes and streams should be done only after careful consideration. Proper site placement and planning should occur to protect shoreline cutting and clearing for home development. Location of new septic systems should only occur on suitable sites where poor filtration or high groundwater tables are not present.

Holmes Creek is a class I Brook Trout stream that lies outside of the Wolf Creek Watershed; however historic logging practices provided a direct connection between Wolf Creek and Holmes Creek. It is unclear how the connection currently affects either stream; however Holmes Creek currently does not appear to have any significant water quality issues or concerns. Legacy sediment impacts from logging are still apparent in the stream and habitat will continue to be a limiting factor. Maintaining intact riparian areas and promoting

sustainable forestry practices employing best management practices for water quality, will continue to provide adequate protection to the stream and maintain current habitat ecological function.

Table 2. Fish IBI and Habitat Assessments for the Wolf Creek, 2014.

2014 Stream - Site	Wolf Creek	Holmes Creek	Wolf Creek	Wolf Creek	Wolf Creek	Wolf Creek
	DS Pike River Road	US Pike River Road	DS Lubke Road	US Keating Road	Island Lake Road	Narragon Road
Stream Order	2	3	2	2	2	2
Mean Stream Width	5	4	10	3	2	14
Station Length	175	140	350	100	100	400
Modeled Natural Community	CWMS	CWMS	CWMS	CWHW	CWHW	CWHW
Verified Natural Community	WMS	CWMS	WMS	WMS	WHW	WMS

Fish Species

Common Shiner	687	74	218	29		27
Creek Chub	21	3	5	1		
Hornyhead Chub	28		189	5		4
Bluntnose Minnow	19	2	5	1	33	4
Northern Hog Sucker	4					
Rock Bass	1		19	1		11
White Sucker	6	13	8	9		4
Tadpole Madtom	2		3			1
Lamprey (Ammocoete)	3	1				
Johnny Darter	1			1		
Rosyface/Carmine Shiner	140					
Central Mudminnow		10	29	6	6	16
Bluegill			5	4	5	20
Yellow Perch			2			1
Banded Killifish			1			8
Yellow Bullhead			19	3		3
Iowa Darter			9	8	12	45
Mimic Shiner		6				
Western Blacknose Dace		2				
Blacksided Darter		1				
Smallmouth Bass	3	5				
Mottled Sculpin		11		1		
Brook Trout		11				
Largemouth Bass	2		3	1		17
Fathead Minnow			2			
Brook Stickleback			1			
Pumpkinseed			1			
Bluegill x Pumpkinseed Hybrid			3			
Weed Shiner			3			
Northern Pike			2			
Green Sunfish					1	
Total # Fish Sampled	917	139	527	70	57	161
Total # Species	11	12	20	13	5	14

IBI Score

Coldwater	-	-	-	-	-	-
Coolwater (CC)	-	-	-	-	-	-
Coolwater (CW)	E (90)	E (100)	E (100)	-	-	-
Warmwater	E (70)	-	E (65)	E (80)	-	G (60)
Small Stream	-	-	-	E (90)	G (50)	G (80)

Habitat

Rating (Score)	F (40)	E (77)	F (53)	E (80)	G (70)	F (53)
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CWMS= Cool-Warm Mainstem
 CWHW= Cool-Warm Headwater
 CCMS= Cool-Cold Mainstem
 CCHW= Cool-Cold Headwater
 WMS- Warm Mainstem

E= Excellent
 G= Good
 F= Fair
 P= Poor

WHW- Warm Headwater
 CW= Coldwater

Green value represents verified natural community score

Table 3. Macroinvertebrate Ratings in the Wolf Creek 2014

2014	Wolf Creek DS Pike River Road	Holmes Creek US Pike River Road	Wolf Creek DS Lubke Road	Wolf Creek US Keating Road	Wolf Creek Island Lake Road	Wolf Creek Narragon Road
Stream - Site						
Stream Order	2	3	2	2	2	2
Mean Stream Width	5	4	10	3	2	14
Station Length	175	140	350	100	100	400
Modeled Natural Community	CWMS	CWMS	CWMS	CWHW	CWHW	CWHW
Verified Natural Community	WMS	CWMS	WMS	WMS	WMS	WMS
HBI Rating ¹	E	E	G	G	G	F
HBI Score ¹	2.91	2.89	5.2	4.64	4.87	6.2
FBI Rating ¹	E	E	G	G	G	F
FBI Score ¹	3.14	3.24	4.54	4.96	4.62	5.64
MIBI Rating ²	G	E	G	E	E	G
MIBI Score ²	6.17	7.54	7.33	8.4	8.23	6.34

- 1) E= Excellent(0-3.5)
 VG= Very Good (3.51-4.50)
 G= Good (4.51-5.50)
 F= Fair (5.51-6.50)
 F= Fairly Poor (6.51-7.50)
 P= Poor (7.51-8.50)
 VP= Very Poor (8.51-10)
- 2) E= Excellent (7.5-10)
 G= Good (5.0- 7.49)
 F= Fair (2.51- 4.99)
 P= Poor (0- 2.5)